Notice of Allowability	Application No.	Applicant(s)	
	10/773,190	SILVERBROOK, KIA	
	Examiner	Art Unit	
	Michael S. Brooke	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.

2. ☒ The allowed claim(s) is/are *1-4,6-23,25-41 and 43-54*.

3. ☒ The drawings filed on *09 February 2004* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been Currently Amended as follows:

In the claims:

1. (Currently Amended) An ink jet printhead comprising:

a plurality of nozzles;

a bubble forming chamber corresponding to each of the nozzles respectively, the bubble forming chambers adapted to contain a bubble forming liquid; and,

at least one heater element disposed in each of the bubble forming chambers respectively, ~~the heater elements configured~~ for thermal contact with **the bubble forming** liquid; such that,

heating the heater element to a temperature above the boiling point forms a gas bubble in the bubble forming liquid in order to cause the ejection of a droplet of ~~ejectable~~ **the bubble forming** liquid from the nozzle; wherein,

the transient rise in pressure within the bubble forming chamber when the bubble forms is less than 20MPa.

5. (Cancelled)

9. (Currently Amended) The printhead of claim 1 configured to receive a supply of the ~~ejectable~~ **bubble forming liquid** at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said

part to cause the ejection of a said drop is less than the energy required to heat a volume of said ~~ejectable~~ **bubble forming** liquid equal to the volume of the said drop, from a temperature equal to said ambient temperature to said boiling point.

11. (Currently Amended) The printhead of claim 1, wherein each heater element has two opposite sides and is configured such that ~~a~~ said gas bubble formed by that heater element is formed at both of said sides of that heater element.

17. (Currently Amended) The printhead of claim 1, wherein each heater element includes solid material and ~~is configured for~~ **has** a mass of less than 10 nanograms of the solid material ~~of that heater element to be~~ **and is** heated to a temperature above said boiling point thereby to heat said part of the bubble forming liquid to a temperature above said boiling point to cause the ejection of a said drop.

18. (Currently Amended) The printhead of claim 1, wherein each heater element is substantially covered by a conformal protective coating, the coating of each heater element having been applied ~~substantially~~ to all sides of the heater element simultaneously such that the coating is seamless.

19. (Currently Amended) A printer system which incorporates a printhead, the printhead comprising:

a plurality of nozzles;

a bubble forming chamber corresponding to each of the nozzles respectively, the bubble forming chambers adapted to contain a bubble forming liquid; and,

at least one heater element disposed in each of the bubble forming chambers respectively, ~~the heater elements configured~~ for thermal contact with the bubble forming liquid; such that,

heating the heater element to a temperature above the boiling point forms a gas bubble in the bubble forming liquid in order to cause the ejection of a droplet of ~~ejectable~~ **the bubble forming liquid** from the nozzle; wherein,

the transient rise in pressure within the bubble forming chamber when the bubble forms is less than 20MPa.

23. (Currently Amended) The system of claim 19, ~~being configured to support~~ **wherein during use,** the bubble forming liquid **is supplied to** ~~in thermal contact with~~ each said heater element, and ~~to support the ejectable liquid~~ adjacent each nozzle.

24. (Cancelled)

28. (Currently Amended) The printhead of claim 19 configured to receive a supply of the ~~ejectable~~ **bubble forming liquid** at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of a said drop is less than the energy required to heat a volume of said ~~ejectable~~ **bubble forming** liquid equal to the volume of the said drop, from a temperature equal to said ambient temperature to said boiling point.

30. The system of claim 19, wherein each heater element has two opposite sides and is configured such that ~~a~~ said gas bubble formed by that heater element is formed at both of said sides of that heater element.

36. (Currently Amended) The printhead of claim 19, wherein each heater element includes solid material and ~~is configured for~~ **has** a mass of less than 10 nanograms of the solid material ~~of that heater element to be~~ **and is** heated to a temperature above said boiling point thereby to heat said part of the bubble forming liquid to a temperature above said boiling point to cause the ejection of a said drop.

37. (Currently Amended) The printhead of claim 19, wherein each heater element is substantially covered by a conformal protective coating, the coating of each heater element having been applied ~~substantially~~ to all sides of the heater element simultaneously such that the coating is seamless.

38. (Currently Amended) A method of ejecting drops of ~~an ejectable~~ **a bubble forming** liquid from a printhead, the printhead comprising a plurality of nozzles;

a bubble forming chamber corresponding to each of the nozzles respectively, the bubble forming chambers adapted to contain ~~a~~ the bubble forming liquid; and,

at least one heater element disposed in each of the bubble forming chambers respectively, ~~the heater elements configured~~ for thermal contact with the bubble forming liquid;

the method comprising the steps of:

heating the heater elements to a temperature above the boiling point of the bubble forming liquid to form a gas bubble that causes the ejection of a drop of ~~an ejectable~~ **the bubble forming** liquid from the nozzle; and

supplying the nozzle with a replacement volume of the bubble forming liquid equivalent to the ejected drop; wherein,

the transient rise in pressure within the bubble forming chamber when the bubble forms is less than 20MPa.

42. (Cancelled)

45. (Currently Amended) The method of claim 38, wherein prior to the step of heating the at least one heater element, a supply of the ~~ejectable~~ **bubble forming** liquid, at an ambient temperature, is fed to the printhead, wherein the step of heating is effected by applying heat energy to the at least one heater element, wherein said applied heat energy is less than the energy required to heat a volume of said ~~ejectable~~ **bubble forming** liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point.

54. (Currently Amended) The method of claim 38, wherein a conformal protective coating is applied to ~~substantially~~ to all sides of each of the heater elements simultaneously, such that the coating is seamless.

The following is an Examiner's statement of reasons for allowance:

The prio art of record fails to teach a transient pressure rise of less than 20 Mpa.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael S. Brooke whose telephone number is 571 272-2142. The examiner can normally be reached on M-F 5:30-2:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael S. Brooke
Primary Examiner
Art Unit 2853

MSB
09/14/04